OPERATING INSTRUCTIONS

BROWNING GOLDEN EAGLE MARK IV BASE STATION

RECEIVER MODEL GOLDEN EAGLE MARK IV

TRANSMITTER MODEL GOLDEN EAGLE MARK IV

FCC TYPE ACCEPTED

TYPE GE4400

IT PAYS TO KNOW YOUR EQUIPMENT

READ CAREFULLY

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BROWNING LABORATORIES, INC.
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SECTION I

THE BROWNING GOLDEN EAGLE MARK IV BASE STATION

GOLDEN EAGLE MARK IV RECEIVER

This is truly the most versatile receiver made for use on the Citizens Band - whether operating on conventional AM or Single Sideband, stations operating on upper or lower single sideband, or double sideband suppressed carrier. Also featured are the following -

- New audio tone control
- Varactor bandspread control with full 300° rotation
- Double conversion for better image rejection
- RF and IF gain control
- AGC On-Off switch
- Beat frequency oscillator/product detector for better sideband reception
- Solid state voltage regulator
- Cascode nuvistor RF amplifier for high gain with low noise
- Ultimate selectivity with extra tuned stages
- Large jeweled movement "S" meter
- Effective noise limiter with lockout switch
- Extra noise limiter for SSB reception
- Illuminated dial
- New expanded frequency coverage
- New printed circuit board construction

GOLDEN EAGLE MARK IV SSB/AM TRANSMITTER

Transmitter Features are -

- New phase locked loop (PLL) generated frequencies +.002% tolerance or better
- Large Meter reads modulation, forward and reflected power, plate current and bias
- New printed circuit board construction
- LED readout for channel numbers
- Class AB linear amplifier for maximum performance in single sideband operation
- Class C RF amplifier for maximum performance in AM operation
- Special ALC circuit for SSB operation (automatic level control)
- Clipper filter and limiter circuit for AM operation
- Spotting for both AM and sideband operation
- Single transmitter mode control AM, LSB, USB
- New unique system for channel selection, featuring adjustable scan rate control and reset function
- New individual SSB filters
- New extra tuned stages for spectral purity
- New unique lock detector
- New specially tailored filter circuit for flatter audio response

SECTION 2

ANTENNA REQUIREMENTS

For ease and simplicity of adjustment, your SSB/AM transmitter is designed to operate into a load of 50 ohms. An antenna fed with 50-ohm coaxial line will satisfy this requirement if the SWR (Standing Wave Ratio) on the line is low. Practically, all good CB antenna systems use 50-ohm coaxial line and are designed to give a low SWR.

Mount your antenna in the clear, away from surrounding objects (especially metallic ones) and as high as allowed by law. The base of the Antenna must be grounded to help prevent TVI and for lightning protection. Use a ground wire connected in as straight a line as possible to a ground stake. If the feed line must be longer than about 50 feet, use RG-8/U rather than the RG-58/U to minimize feedline losses. (Reducing losses helps on transmitting and receiving.)

An RG-58/U or RG-8/U line feeding an antenna, and showing an SWR of 1.0-to-1 or close to it, will present a load of 50 ohms to the transmitter regardless of the line length. This ideal situation is seldom found in practice. Even if the SWR proves to be 1.5-to-1, the line length will not be important and the transmitter will work at optimum performance.

If your transmitter works into an improper load, the maximum available power of the transmitter will not be obtained. In extreme cases, distortion will accompany the reduction in output. Obviously, to get the maximum performance from your transmitter, you should present the transmitter with a load close to 50 ohms.

When a too-high SWR is encountered the best cure is to adjust or trim the antenna for a proper match. Check the instructions that come with the antenna for the best way to adjust it. If this is impossible you can use a matching network or "match box" between the transmitter and the feed line. These networks are described in several popular antenna texts.

ANTENNA GAIN

We recommend using the best antenna obtainable. For coverage in all directions without using a rotating mechanism, a "ground-plane" antenna is satisfactory. A "co-linear" type antenna will increase your signal at the receiving end by about 3½ db (equal to just a little more than doubling your output power). For better results, a rotatable directional antenna should be used. A "3-element beam" will have a gain of approximately 7 db, equivalent to multiplying your output power by 5.

Since your output power is limited, it is obvious that much can be gained with a good antenna system.

SECTION 3

INSTALLATION

INTERCONNECTING THE GOLDEN EAGLE MARK IV TRANSMITTER AND RECEIVER

Unpack your base station carefully.
Arrange your station so the units are side by side. DO NOT put one on top of the other and DO NOT place units in an enclosure. They must have ventilation on all sides.

Connect the "Control Cable" of the transmitter to the receiver.

Note that the control cable is polarized. Be sure to align male plug to the female socket before connecting together.

Permanently connected to the transmitter is the antenna cable for the receiver. Connect the PL-259 plug on this cable to the socket on the receiver marked ANT.

Never attempt to operate the transmitter without connection to a proper antenna or dummy load. (See Section 2) Serious damage can result and such damage will not be covered by Warranty.

Place the microphone in front of the equipment.

Unwrap the microphone cable and insert the connector into the microphone socket on the left of the front panel.

CAUTION

If any microphone other than the model supplied is used, make sure that Pin #4 of the microphone connector is not wired to anything.

Using the ground post on the Mark IV Receiver, be sure to connect the units to a good earth ground to prevent shock hazard and to assist in lightning protection.

Make certain that the Receiver Power Switch is turned to OFF.

After checking the above connections for correctness and tightness, insert the receiver power cord into a wall outlet.

Your Golden Eagle Mark IV Base Station is now ready to be placed in service after the following tests and tuning adjustments have been made: Refer to the next section (Operating the Mark IV Base Station).

MARK IV AM/SSB TRANSMITTER TESTS

With the Mark IV AM/SSB Transmitter, proceed as follows:

Mode Switch - LSB
Meter Switch - MA

Turn the power switch on and allow at least two minutes warm-up. Press the microphone button and observe the transmitter meter indication. (Be sure not to talk into the microphone and also make sure there is no background noise.) Check that the meter needle falls within the small brown shaded area indicated by the word "BIAS" as this is the proper meter indication.

SECTION 3

If your transmitter is tuned properly, the following adjustment is not necessary:

WARNING:

The following adjustment can only be made by an FCC Licensed Technician; removal of the cover located on the right rear by other than an FCC Licensed Technician is in violation of the FCC Rules and Regulations.

Carefully adjust the rear panel control marked "BIAS" so the pointer on the meter is in the center of the box marked "BIAS." Variations in line voltage will affect this reading, but operation will be completely satisfactory if the BIAS setting remains within this brown box. Release the microphone button.

CAUTION:

Failure to adjust this control properly will result in poor performance of the equipment. If the idling plate current is too low, distortion will result. If the idling plate current is too high, life of the output tube will be greatly shortened. Over an extended period of time, it may become impossible to set the BIAS CONTROL AND BRING THE IDLING PLATE CURRENT WITHIN THE BROWN SECTION on the meter. If this occurs, replace the 7558 amplifier tube and immediately adjust the BIAS control using the above procedure (starting with the BIAS control set near the center of its range).

SECTION 4

OPERATING THE GOLDEN EAGLE MARK IV BASE STATION

NORMAL OPERATION OF RECEIVER AM (Simplified Instructions)

1. Mode Switch - AM
2. Volume On-Off - Turn on and set approximately 9 o'clock
3. Squelch - Pushed in and counter-clockwise
4. Tuning - CB1 or CB2
5. RF Gain and AGC - Max. clockwise - AGC Pushed in
6. Main Tuning - Channel Desired (same as transmitter)
7. Bandspread - Indicator at 12 o'clock

NORMAL OPERATION OF RECEIVER SSB (Simplified Instructions)

1. Mode Switch - USB or LSB
2. Volume On-Off - Turn on and set approximately 9 o'clock
3. Squelch - Pulled out and counter-clockwise
4. Tuning - CB1 or CB2
5. RF Gain and AGC - (Important) Approximately 3 o'clock depending on signal strength and pulled out
6. Main Tuning - Desired Channel (same as transmitter)
7. Bandspread - Indicator at 12 o'clock

NORMAL OPERATION OF AM/SSB TRANSMITTER (Simplified Instructions)

1. Mode Switch - AM (Switch to LSB or USB if operating Sideband)
2. Meter - Mod) These positions do not
3. SWR Calibrate - Approx. 12 o'clock) affect operation of unit.
4. Channel Selector - Channel Desired

For Tuning in Sideband Stations, Section 7, Page 12.

SECTION 5

OPERATING THE GOLDEN EAGLE MARK IV RECEIVER

FUNCTION OF OPERATING CONTROLS

Mode Switch

The position of this switch determines what type of signal is received.

1. AM Position - With the Mode Switch in the AM position, Normal Amplitude Modulated signals may be received.
2. USB Position - With the Mode Switch in the USB position, only Upper Sideband signals may be received.
3. LSB Position - With the Mode Switch in the LSB position, only Lower Sideband signals may be received.

NOTE: It is possible to hear AM signals when on SSB and if tuned properly it can be understood but not as well as on AM. It is also possible to hear the opposite sideband but it will not be clear.

Volume On-Off Control

The On-Off switch at the extreme counter-clockwise rotation of the Volume control controls the power to the receiver as well as the transmitter.

Squelch Control

When rotated clockwise, the Squelch control can be set so that the speaker will be silent until a signal comes on. Further clockwise adjustment will keep the speaker silent on weaker signals and turn on the audio only on strong local signals. When set at the maximum counter-clockwise position, the audio will be on all the time. The squelch does not improve the signal strength or reduce noise. It is only an automatic switch that turns the speaker on and off depending on the presence and strength of the incoming signal.

Tuning Control

This switch controls the Tuning Mode

1. CB1 - In the CB1 position, the main Tuning knob varies the frequency of the second oscillator. The received channel number can be read on the upper scale in the Tuning Window.
2. CB2 - In the CB2 position, the main Tuning Knob varies the frequency of the second oscillator. The received channel number can be read directly from the dial on the lower scale. Beyond channel 40, the 10 kHz frequency steps are denoted by actual frequencies from 27.415 MHz through 27.595 MHz.
3. XTAL - In the Crystal position, the frequency is controlled by a crystal located on the Receiver Front End Board (A-10008). Any one of the CB-1 channel crystals may be obtained from your Browning dealer if you desire to use this function for monitoring AM stations only.

SECTION 5

OPERATING THE GOLDEN EAGLE MARK IV RECEIVER

FUNCTION OF OPERATING CONTROLS (cont'd)

RF Gain Control and AGC

The RF Gain Control not only varies the gain of the Cascode RF Stage but also the first two IF stages. Maximum Gain is obtained with the control set maximum clockwise. As the control is rotated counter clockwise, the bias of the first RF and first two IF tubes increases with a resultant decrease in Gain. This control is used for decreasing the sensitivity to prevent overload from strong signals.

The S Meter reading will not be accurate except at full clockwise setting.

In Sideband operation this control becomes very important and should be adjusted carefully depending on the strength of the incoming signal. See Section 7.

The AGC can be disabled by pulling out on the RF Gain Control Knob. When operating in the AM position, the AGC Switch should be on to prevent blasting when tuning from weak to strong signals. It can be helpful, however, when tuning for very weak stations to disable the AGC for maximum sensitivity.

Noise Limiter Switch - AM Operation

The Noise Limiter is controlled by a push-pull action of the squelch control knob. When pushed IN this placed the automatic series gated noise limiter circuit in operation to reduce pulse type noises such as ignition noise and other electrical interference. The Limiter is turned OFF by pulling the squelch knob out. A separate noise limiter is switched in automatically when on Single Sideband.

"S" Meter

The "S" Meter provides a visual indication of the relative signal strength of an incoming signal. The "S" Meter is calibrated in "S" units from 1 to 9 and in decibels above S-9 to plus 40 db.

The "S" Meter is not accurate when the AGC control is pulled out.

SECTION 5

"S" Meter Zero Control

Disconnect the antenna connection to the receiver and adjust the "S" Meter Zero control at the rear of the chassis. Watch the "S" Meter while turning the control and set the needle at 0, the lowest line on the meter. This adjustment may vary slightly with changes in line voltage. Now reconnect the antenna cable.

External Speaker Jack

This allows an external speaker to be used. However, this disconnects the front panel speaker when a plug is placed in the external speaker jack.

Bandspread

To increase the ease of tuning a Sideband signal, Browning has incorporated a silky smooth varactor tuning control with full 300^{o} rotation.

This feature gives added ease of differentiating between two or more stations close together and is especially useful for tuning in sideband stations.

SECTION 6

OPERATING THE GOLDEN EAGLE MARK IV AM/SSB TRANSMITTER

FUNCTION OF OPERATING CONTROLS

Channel Selector

The AM/SSB Transmitter has a unique feature to select channels. When the control is rotated towards the "Hi" position (CW), the unit will scan automatically up in channels from 01 to 40 or until the operator reaches the desired channeland releases the control. When the control is rotated towards the "Lo" position (CCW), the unit will scan automatically down in channels to 01 or until the operator reaches the desired channel and releases the control.

NOTE: The unit has automatic channel limiting at channels 01 and 40 and will not operate on any channels above 40 or below 01. When a limit is reached, the channel selector must be operated in the opposite direction for the display to change either "Hi" or "Lo" depending on which limit has been reached.

Scan Rate

The Scan Rate control allows the operator to adjust the channel-per-second change of the display to his personal preference. Turn the control CCW, for a slower rate or CW for a faster rate of channel incrementing.

Test Switch

RESET: When placed towards the left, the unit will automatically revert to channel 01. This allows the operator to rapidly return to the low end of the band from the high end.

NOTE: Should the display go dark, indicating the PLL is out-of-lock, operate the Test Switch to RESET and the display should show 01.

In the process of selecting channels, The transmitter power is removed and no RF is generated until the channel selector switch is returned to the center position.

LED: When placed towards the right, the display LED's may be checked by noting that all segments are lit and the numbers 88 are displayed. NOTE: The LED position of the Test Switch will override any channel display.

Mode Switch

This switch changes the mode of operation from a True AM to a Pure Single Sideband Transmitter (Lower Sideband or Upper Sideband). The Annunciator window will light to indicate what mode of operation is selected.

SECTION 6

Meter Switch:

MOD - In this position the meter monitors modulation. On AM the needle should go full scale on peaks indicating 100% modulation. The top scale is used for audio level in the Sideband mode. (Voice peaks no greater than 15 on the meter.)

FWD - This position is to be used in the AM mode only to monitor relative RF power and work in conjunction with the SWR calibrate control.

REF - This position is also to be used in the AM mode along with the FWD position to read SWR. The following procedure is to be followed for reading SWR -

1. Mode Switch - AM
2. Meter Switch - FWD

With the antenna connected, depress the microphone and adjust the SWR calibrate control for maximum deflection on the Meter. Readings less than full scale may be caused by antenna mismatch. If after correcting the mismatch meter still does not reach full scale just set it as high as it will go. Without touching this control switch to REF on the meter switch and refer to the SWR chart.

SWR Chart for AM/SSB Transmitter only

The following readings are an indication of SWR on the Antenna System - Use the top scale.

Reflected Reading	SWR
0	1 to 1
4	2 to 1
6.5	2.4 to 1
10	3.8 to 1
14	8 to 1
16	10 to 1

NOTE: This is for reference only and should not be used to tune an antenna.

MA

This position is to be used in the Sideband mode only for checking the BIAS as indicated in the AM/SSB transmitter checks on page 3.

NOTE: The position of the meter switch does not affect transmitter operation. It only allows the meter to monitor different functions.

SPOT

Spot is used to tune your Receiver to exactly the same frequency as your transmitter. In AM push the Spot and tune the Received for macimum S-Meter deflection. In SSB push the Spot and tune below the channel for LSB and above for USB. Proper SPOT switch operation is achieved by tuning the Receiver to obtain a zero beat. This condition occurs when no tone is heard between two rising tones. (Sometimes referred to as a "Null".)

NOTE: It is possible to get a Zero beat on the opposite Sideband so make sure you tune in the right direction for the Sideband you are on.

SWR Calibrate:

This control varies the level of sampled RF to the meter in the forward position and in no way affects the level of RF going out the antenna.

SECTION 6

MATCHING THE GOLDEN EAGLE MARK IV AM/SSB TRANSMITTER TO YOUR ANTENNA SYSTEM

Antenna Check

WARNING: The following adjustments can only be made by an FCC Licensed Technician. Removal of the cover over the controls by other than an FCC Licensed Technician is in violation of the FCC Rules and Regulations.

Turn Power on and let the transmitter warm up for at least 2 minutes.

With a dummy load connected, set the transmitter controls as follows:

Meter Switch	-	FWD
Channel Selector	-	20
Mode	-	AM

Remove the cover on Transmitter Right Rear.

Press the microphone button and adjust the SWR Calibrate for approximately 1/2 scale on the meter. With a small screwdriver, carefully adjust the plate tuning control (Rear Chassis) for maximum meter deflection. Make a note of this reading on the 50-ohm dummy load. Release the microphone button.

Output Tuning Check

Remove the dummy load from the Transmitter ANT connector and connect your antenna system.

Press the microphone button and, with a screwdriver, adjust PLATE TUNING control (rear panel) for maximum meter indication. (Little or no readjustment may be required, but this check must be made.) The meter reading may not be exactly the same as obtained with the dummy load, but this merely means the antenna load is not exactly 50 ohms. The reading may be higher or lower than that obtained with the dummy load; one is no better or worse than the other. Power on an in line wattmeter may also be higher or lower. This is why you must use a Dummy Load when measuring output power.

Your Golden Eagle Mark IV AM/SSB Transmitter is now ready to be placed in service. Please note that the radio is designed for normal voice levels. Never shout into the microphone; to do so will result in much less than peak performance.

When operating on either AM or Sideband, put the meter switch in the MOD position for accurate audio level monitoring on the meter.

Voice peaks should be regarded like those on a tape recorder's VU Meter.

When operating Sideband, use the top meter scale; voice peaks should not swing past 15. If these peaks are exceeded, the ALC (Automatic Level Control) will take over and reduce the effective power level and clarity of transmission.

When operating on AM, use the center scale which monitors % modulation. Voice peaks on this mode of operation will peak between 80% to 100% modulation.

SECTION 7

TUNING SIDEBAND STATIONS

Tuning in a Sideband Station whether single or double sideband is easy only when one becomes experienced after considerable practice.

When receiving sideband stations there is no carrier received. Therefore, a "carrier" must be inserted by the receiver's beat frequency oscillator. This "carrier" must be placed in very exacting position in relation to the received signal being transmitted. Naturally if this is not done exactly, the received signal will be unintelligible or badly distorted.

When a sideband signal is heard, switch to LSB first and remove the noise limiter and AGC by pulling these two switches out. Reduce the RF gain control to about 3 o'clock (very weak or very strong signals may require a higher or lower setting) and advance the volume control if necessary.

Carefully tune the main tuning just below the center of the channel (approx. 1/4 channel below the center of the channel) so as to coarse tune the sideband signal. Now very carefully fine tune with the band spread control to bring the receiver's beat frequency oscillator into line with the received signal. If the transmitted signal is on LSB, clear audio should be received. However, if the signal is on USB, one will not be able to tune this signal in on LSB. Switch to USB, reset the bandspread control so the pointer is at 12 o'clock, and carefully adjust the main tuning just above the center of the channel (approx. 1/4 channel above the center of the channel.) Again fine tune with the bandspread control to obtain a clear received signal.

The resultant signal may sound very squeaky and high pitched or very gutteral and low pitched, but careful tuning will change it to a good readable signal.

The proper use of the RF gain control will make your sideband reception better. Set the volume control for a comfortable level and then leave it alone. Use the RF gain control as if it were the "Volume" control.

Another point to remember is that two stations may already be in contact on a very slightly different frequency. You will only be able to tune one clearly but may be able to listen to both by tuning one on the high side and the other on the low side. In other words between them. This however cannot always be done due to the variations in their crystals. No fault of your receiver. Unlike regular AM, listening to more than one station at a time on sideband is very hard to do.

SERVICE RETURN INSTRUCTIONS

The extreme selectivity and sensitivity of the Golden Eagle Mark IV Receiver can only be attained through the use of precise test equipment.

NO ONE should attempt to make adjustments to the receiver without the proper equipment. Browning will not be responsible whether under warranty or not for work needed to be performed when examination indicates that internal adjustments of any kind have been made by unauthorized persons.

If trouble develops with your unit which you cannot remedy yourself, contact your Browning franchised distributor. If it is necessary to return it to Browning, list all possible symptoms (such as condition under which problem occurs and if it is constant or intermittent) that might be helpful information.

Before returning your unit be sure all parts are securely mounted and well packed. Also, attach a tag to your equipment with complete name and address and return all parts pertaining to the operation of the unit; i.e., microphone. Do not send manuals and schematics.

Please enclose a letter with your unit indicating all of your problems. Remember, even if you have called in advance about your equipment a letter enclosed with your equipment will expedite matters both in receiving and the repair department.

If you plan to bring your equipment to Browning in person, please call or write in advance for an appointment.

We do not recommend returning transceivers, receivers, or transmitters via Parcel Post as this equipment is too heavy and delicate. Prepay and insure all shipments.

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WARNING

The use of this equipment must comply with Part 95 of the Federal Communications Commission Rules and Regulations and failure to do so will subject the operator and all owners to severe fines and penalties.

The proper adherence to these rules and regulations by all will improve the efficiency and operating pleasure for everyone.

Any alterations of the transmitter by anyone other than the manufacturer is a violation of F.C.C. regulations and punishable accordingly and voids your warranty.

Only a licensed FCC technician is allowed to make adjustments to the transmitter.

Whenever changing of a component is necessary, replace only with quality parts recommended by Browning. Failure to do so could result in improper functioning of the unit and will violate FCC regulations subjecting the operator and all owners to severe fines and penalties.

LIMITED WARRANTY

Browning Laboratories, Inc., warrants each new radio product to be free from defective material and workmanship, and if it is found to be defective within one (1) year from date of first sale to the original retail purchaser, the factory will either, at its discretion, replace or repair equipment or parts which are delivered transportation and insurance prepaid by the owner to us or to our authorized distributor or dealer from whom purchased or to a Browning Authorized Warranty Service Station. As an exception, Vacuum Tubes are warranted for ninety (90) days.

Our obligation is limited to repairing or replacing those products which were delivered intact for examination and, which in our opinion, became defective under normal installation, use, and service and which were not subject to neglect, accident, modification in wiring not of our own instruction, or use in violation of instructions furnished by us. To place warranty in effect, the unit must be warranty registered with the factory at the address listed below.

This warranty is in lieu of other warranties expressed or implied; and no representative or person is authorized to assume for us any other liability in connection with the sale of our products. Browning Laboratories, Inc., reserves the right to make any changes in design, or to make additions and improvements in its products without imposing any obligation on itself to install them in its products previously sold.

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